THURSDAY, SEPTEMBER 26, 1872

BALFOUR'S PALÆONTOLOGICAL BOTANY

Introduction to the Study of Palæontological Botany. By J. H. Balfour, A.M., &c., Professor of Botany, Edinburgh. (Edinburgh: Adam and Chas. Black, 1872.)

THE mastery of an alphabet by a child depends on his recognising and remembering the differences in form of the various arbitrary signs which we conventionally use to represent different sounds. Perhaps in the face of the alphabetic researches of Mr. John Evans we should withdraw the qualification—arbitrary. He may see a connection between the sign and the sound, and be able to give a reason for the various forms employed, and explain the influence of this horn or that loop superadded to the simple line in modifying the sound. We are, however, at a loss to discover what possible connection of affinity or even of analogy can exist between the signs O and Q and the sounds they represent. Whatever the recondite researches of the antiquarian may discover, the letters of the alphabet are practically recognised and universally received as arbitrary signs for particular sounds. The mastery of the alphabet is only the recognition and remembrance of the different signs and the sounds they represent.

This mnemonic education is not unfrequently the only education which some attain to, or perhaps are capable of. In science not a few are looked up to as masters whose extensive knowledge is nothing more than the faculty of discerning differences joined to a good memory. The rationale of the difference is another matter; perhaps they are mentally incapable of appreciating whether the distinguishing characteristics at once perceived by them are dependent on the absence of affinites or of analogies. The differences exist—that is their goal.

Many entomologists prosecute their labours on this low platform, and in botany the mere herbarium systematist occupies the same position. The one classes beetles, and the other plants as the lexicographer arranges words, by a method that exhibits their differences and permits easy reference.

But in no division of science is this class so common as in geology. The mere perception and memory of differences will give one a high class position as a palæontologist: and much useful work will such a one do—work necessary to the progress of science. True, it is not the highest class of work, and too frequently men who are experts at it aim at something higher. But deficient in the power of appreciating analogies, or recognising affinities in the points of resemblance, or their absence in the points of difference; deficient also in the exact knowledge of zoology or botany, such men have grandiloquently proclaimed and ignorantly and of course obstinately defended the most absurd opinions. Confined to the useful work of separating and recording different forms their services to science are most valuable, but the interpretation of obscure structures, and the higher problems of science, must be left to others able to deal with them.

No greater source of the evils we deprecate exists than the common but erroneous practice of separating palæontology as a science by itself. Palæontology has no grounds for recognition as an independent science. The organisms of an existing geographical province might be excluded from zoology and botany on the same grounds that are employed to exclude the plants and animals of a geological period. Zoologists are far ahead of botanists in getting rid of this error. Extinct forms have their place in every philosophic estimate of the animal kingdom. In botany, on the other hand, the study of fossil forms has been recently characterised as a non-scientific pursuit engaging the attention of the "geologist"; extinct plants are excluded from systematic works, and if dealt with at all in class books, all reference to them is eliminated from the general text, and they are confined to a page or two, or relegated to an obscure appendix.

Great praise is due to Prof. Balfour for introducing a different order of things. His manuals have always to a greater extent than any others published in the English language dealt with fossil plants; and he has now given us a special introduction to botanical palæontology. From the position obtained by the study of structural and systematic botany he deals with the problems presented by fossil plants.

The earlier pages of the work are occupied with preliminary considerations as to the difficulties which present themselves in attempting to determine fossil plants, the different conditions of preservation in which their remains occur in the stratified rocks, the accepted classification of the sedimentary deposits, and the like.

The plan of the work itself is to treat of the plants as they are associated in the different recognised formations. Looking at palæontology as a separate section of the science of botany this is no doubt the obvious method of treatment, just as in geographical botany we deal with the different provinces of the surface of the earth and the floras which characterise them. If, however, the stratigraphical aspects had been subordinated to the systematic, a more valuable and instructive exhibition of the past vegetation of the globe would have been before us. For example, had the Coniferæ been traced from the first known occurrence of Abietineous wood in the Devonians, through the anomalous Araucarian wood and the Taxineous fruits of the Carboniferous rocks, the last types represented by the Walchias of the Permians and the Voltzias of the Trias, up to the appearance of the still existing groups in the Oolitic and Cretaceous rocks, an exhibition of extinct forms would have been given which would have conveyed to the botanist a clear and comprehensive view of the Order. In this way important light would be thrown on the present geographical distribution of orders and even genera. Look, for instance, at *Araucaria* and *Sequoia,*—two genera limited in numbers as well as in geographical distribution. We find the first represented by several species in our Secondary rocks, entirely absent from the Tertiaries, and at length banished to the southern hemisphere; while *Sequoia* appears in the Cretaceous strata, persists through the lower Tertiaries, and is now limited to a small geographical province in Western North America.

Nevertheless much may be said for the method adopted by Prof. Balfour. So long ago as the year 1828, Adolphe Brongniart detected a correspondence between the great divisions of the vegetable kingdom and the great epochs

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of the earth's history. He correlated the predominance of Cryptogams with the Primary epoch, of Gymnosperms with the Secondary, and of Angiosperms with the Tertiary. The discoveries of the half century that have elapsed since Brongniart published his views have confirmed the broad truth of his generalisations. Recently they have been expounded and illustrated by one who worthily follows his illustrious countryman in this particular field of study,—by the Comte de Saporta in the preface to his Tertiary Flora of the South of France.

Accepting this classification, which is so far both systematic and stratigraphical, Prof. Balfour prepares the student for dealing with the more obscure fossil remains by introducing each epoch with a *résumé* of the leading characters of the great group of plants which are found in it, drawn from their living representatives. The fossils characteristic of the various formations then follow in detail. The most recent observations are given. Look, for example, at the illustrations and descriptions of the fructification of the Cryptogamic plants of the Coal measures—the ferns, club-mosses and mares-tails—brought together here for the first time.

The numerous woodcuts and the admirable plates greatly enhance the value of the volume.

WM. CARRUTHERS

THE BRITISH MUSEUM PHOTOGRAPHS

Photographs from the Collections of the British Museum. Taken by S. Thompson. 1st Series. (London: W. A. Mansell and Co.)

AMONG all the varied purposes to which the art of photography has been applied, there is perhaps none for which it has proved itself more valuable than for the reproduction of ancient works of art. It matters not whether it be the sublime conception of some ancient Greek sculptor, the thorny-looking inscription on a Babylonian brick, or the stone hatchet of some prehistoric troglodyte, in each case the reproduction by the camera, if executed by a competent operator, will give a more vivid and faithful idea of the original than any drawing by however skilful an artist.

In the case of inscriptions, of minute patterns, of delicacy of form, or of the distinctive character of an object, the merely mechanical process, though not entirely without its drawbacks, possesses a great advantage over the skilful artist, inasmuch as it is entirely free from prejudice. The artist, however conscientious, is always prone to draw incorrectly such details as he does not understand, and to attempt some improvement in force and effect in those which he fully appreciates. It is only in the case of coins and of other small objects which it is necessary to hold in more than one light in order fully to discern the details, that a good drawing is preferable to a photograph; and then the question arises, what is a good drawing?

For rendering available to students the contents of a museum, photography is invaluable. By it the objects which, in many instances, it is impossible to study at leisure in their repository, are, as it were, rendered portable, and made available for extended examination at home, and for reference at a moment's notice. It is with great satisfaction, therefore, that we see this series of nearly a thousand quarto photographs of objects in our national collections issued to the public by Messrs. Mansell and Co. It is divided into seven parts—ethnographical and pre-historic, Egyptian, Assyrian, Grecian, Etruscan and Roman, Mediæval, and Seals, and one great advantage to the student is that he is by means of a comprehensive catalogue enabled to make his own selection of such photographs as come within his own particular province.

That the choice of the objects to be photographed has been judicious may be inferred from the fact that it has been made by the aid of Dr. Birch, Mr. Charles Newton, Mr. A. W. Franks, Mr. Murray, Mr. George Smith, and Mr. Walter de Gray Birch, all well known for their labours in the departments which they represent. Four of these gentlemen have also prepared the catalogue.

The photographs themselves are remarkably well and clearly executed, the figures in all cases being sufficiently large to make the details visible. We have but one fault to find, which it is to be hoped may be easily remedied—the absence of any scale on the photographs, and of any dimensions in the catalogue. In the case of some of the pre-historic and ethnographical objects it would also be an advantage if further particulars were given as to the localities from which they were obtained.

The catalogue is accompanied by an interesting introduction from the pen of Mr. Charles Harrison, giving a good general view of the progress of human civilisation, which the objects photographed illustrate, and also giving the rationale of the whole series. We cordially concur in his hope that each local museum will have its objects photographed, and that the plates like these may be made accessible to the public at a fixed moderate cost. In the meantime we commend these illustrations of our rich national collection to the readers of NATURE.

OUR BOOK SHELF

Autumns on the Spey. By A. E. Knox, M.A., F.L.S. Author of "Ornithological Rambles in Sussex, &c. (London: Van Voorst.)

WE have seldom come across a book in which the *dulce* and the *utile*, science and amusement, are so happily combined as in the modest little volume before us. Mr. Knox's main object, apparently, in spending his autumn on the Spey, was to fish for salmon in that trying river; and some of his wonderful achievements in this exciting occupation are narrated in an almost fascinating, and certainly unpretentious manner, in a few of the chapters of his booklet. But it would be a great mistake to consider this merely a book of sport, and Mr. Knox nothing more than a genial "piscator;" he has already proved what is confirmed by this his most recent work, that his knowledge of British zoology, and especially ornithology, is extensive and thorough. To any one who desires to see the report of a trained and patient observer on the zoology, and even geology, of the basin of the Spey and of contiguous districts, we would with confidence recommend Mr. Knox's work. It contains much that is valuable and interesting on these subjects, and a good deal that is new to many. Quite charming and very curious is his account of the *modus operandi* of a family of crossbills (*Loxia curvirostris*) which he watched while standing under a tree, a few inches above his head, busily engaged at their marvellous employment of splitting the

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